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Remarks

This application has been reviewed in light of the Office Action of February 26, 2003. Claims 1-20 are pending, and all claims stand rejected. In response, claims 6, 7, 15, 16 are amended; and the following remarks are submitted. Reconsideration of this application, as amended, is requested.

Claims 6, 7, 15, and 16 are rejected under 35 USC 103 and have been amended responsively in the suggested manner. Applicant asks that the Examiner reconsider and withdraw this ground of rejection.

Claims 1-20 are rejected under 35 USC 103 over Salatino '343, Chiu '132, and Sato '064. Applicant traverses this ground of rejection.

The present invention provides a method for bonding two components together. A bonding medium, including malleable spheres and an uncured adhesive, is placed between the two components. The two components are then bonded together by pressing them together in a bonding apparatus so that the malleable spheres bond to the two components. The malleable spheres hold the two components in a fixed position for a period of time, and the adhesive is allowed to cure.

In a particularly advantageous use of the invention, the two components are removed from the bonding apparatus before the adhesive cures completely, and curing is completed with the two components removed from the bonding apparatus. The malleable spheres hold the two components together in precisely the right orientation during the completion of the curing, but after the bonding force is removed. This technique allows the expensive bonding apparatus to be used more efficiently, by being used only in the initial stages of the bonding. The partially bonded components are removed during the latter stages, so that more pairs of components may be processed through the single bonding apparatus.

None of the references contemplate such a process, as may be seen by

comparing the teachings of the references with the claim recitations.

The following principle of law applies to all sec. 103 rejections. MPEP 2143.03 provides "To establish prima facie obviousness of a claimed invention, all claim limitations must be taught or suggested by the prior art. In re Royka, 490 F2d 981, 180 USPQ 580 (CCPA 1974). All words in a claim must be considered in judging the patentability of that claim against the prior art. In re Wilson, 424 F.2d 1382, 1385, 165 USPQ 494, 496 (CCPA 1970)." [emphasis added] That is, to have any expectation of rejecting the claims over a single reference or a combination of references, each limitation must be taught somewhere in the applied prior art. If limitations are not found in any of the applied prior art, the rejection cannot stand. In this case, the applied prior art references clearly do not arguably teach some limitations of the claims.

Claim 1 recites in part:

> placing a bonding medium between the first component and the second component, the bonding medium comprising
>
> at least two malleable spheres made of a metal that bonds to both the first component and to the second component when subjected to a sufficiently large force, and
>
> a quantity of an uncured adhesive; thereafter
>
> bonding the first component to the second component using the bonding medium, the step of bonding including the steps of
>
> supplying a bonding apparatus having at least one force actuator;
>
> the bonding apparatus pressing the first component against the second component in a facing-but-spaced-apart relation, with the bonding medium therebetween, with a sufficient bonding force to bond the malleable spheres both to the first component and to the second component, simultaneously
>
> monitoring at least one measured bonding reaction of the

first component and the second component, and simultaneously

controlling the bonding apparatus responsive to the step of monitoring, and thereafter

curing the adhesive." [emphasis added]

Claims 11 and 20 are similar in relevant respects.

A key feature of the present approach is that the malleable spheres are used with a curable adhesive that is initially uncured and then is cured during the processing. The explanation of the rejection equates heating the disclosed thermoplastic material of Salatino with "curing" of the thermoplastic material (e.g., 3 lines from the bottom of page 4 of the Office Action, "heating, i.e., curing step..."). Actually, a thermoplastic material does not cure at all. The curing of polymers is a chemical reaction and cross linking of a monomer or lesser-cross-linked polymer that produces the final polymer. A thermoplastic material softens when heated, does not cross link, and does not cure. Applicant attaches hereto the relevant page from the Cassell Dictionary of Chemistry explaining the difference between thermoplastic and thermosetting materials. As noted, the thermoplastic material may be repeatedly heated without cross linking or curing. Salatino's method requires the use of such a non-cross-linking material, because there are sequential heating steps (i.e., 13 and 15 in Figure 1, and 62 and 64 in Figure 9). If a curable thermosetting material were used, the setting would occur in the first of each of the pairs of heating steps (i.e., step 13 or step 62), and the subsequent heating step (i.e., step 15 or step 64) would not be operable because the curing would already be complete. Chiu does not teach the use of a curable adhesive, and Sato achieves bonding by compression-bonded bumps and does not appear to use an adhesive at all.

None of the three references teaches this aspect of the claim recitation, and the present approach is not operable without the use of the curable adhesive..

Consequently, none of the references teach the bonding of the malleable spheres to the components and thereafter curing the adhesive.

There is also a misunderstanding in the ordering of the steps in Salatino. The explanation of the rejection (page 4, third and fourth lines from bottom of page) argues

that "...heating, i.e., curing step, occurs after the joining...In Figure 1, pressing/joining occurs at step 14 and heating occurs afterwards at step 15." Applicant must respectfully disagree with this characterization. In step 14, there is nothing more than an alignment (col. 4, lines 17-18). The joining occurs solely in step 15 (col. 4, lines 31-33). Thus, the joining is accomplished by the heating and cooling of the thermoplastic adhesive material--they are necessarily the same thing and are performed simultaneously. The "thereafter" language found near the end of claims 1, 11, and 20 is not met by the teachings of the references.

Claim 20 recites in part, and claims 10 and 19 have a similar recitation:

> "removing the bonding force prior to completion of full curing of the adhesive"

There is no teaching of this limitation in the references. The bonding force is necessarily maintained during the joining in the approach of Salatino, see the discussion at col. 4 lines 56-62. The compressive force required to compress the particles 37 between the pads must be maintained until after the adhesive joining is accomplished in step 15.

The present rejection seeks to perform a hindsight reconstruction based upon unrelated references, which is technically unsupported and is legally improper. The case authority and the MPEP provide guidance on this point. The present rejection is a sec. 103 combination rejection. It is well established that a proper sec. 103 combination rejection requires more than just finding in the references the elements recited in the claim (but which was not done here). To reach a proper teaching of an article or process through a combination of references, there must be stated an objective motivation to combine the teachings of the references, not a hindsight rationalization in light of the disclosure of the specification being examined. MPEP 2143 and 2143.01. See also, for example, In re Fine, 5 USPQ2d 1596, 1598 (at headnote 1) (Fed.Cir. 1988), In re Laskowski, 10 USPQ2d 1397, 1398 (Fed.Cir. 1989), W.L. Gore & Associates v. Garlock, Inc., 220 USPQ 303, 311-313 (Fed. Cir., 1983), and Ex parte

Levengood, 28 USPQ2d 1300 (Board of Appeals and Interferences, 1993); Ex parte Chicago Rawhide Manufacturing Co., 223 USPQ 351 (Board of Appeals 1984). As stated in In re Fine at 5 USPQ2d 1598:

> "The PTO has the burden under section 103 to establish a prima facie case of obviousness. [citation omitted] It can satisfy this burden only by showing some objective teaching in the prior art or that knowledge generally available to one of ordinary skill in the art would lead that individual to combine the relevant teachings of the references."

And, at 5 USPQ2d 1600:

> "One cannot use hindsight reconstruction to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention."

Following this authority, the MPEP states that the examiner must provide such an objective basis for combining the teachings of the applied prior art. In constructing such rejections, MPEP 2143.01 provides specific instructions as to what must be shown in order to extract specific teachings from the individual references:

> "Obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention when there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. In re Fine, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988); In re Jones, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992)."
>
> * * * * *
>
> "The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also

suggests the desirability of the combination." In re Mills, 916 F.2d 680, 16 USPQ2d 1430 (Fed. Cir. 1990)."

* * * * *

"A statement that modifications of the prior art to meet the claimed invention would have been 'well within the ordinary skill of the art at the time the claimed invention was made' because the references relied upon teach that all aspects of the claimed invention were individually known in the art is not sufficient to establish a prima facie case of obviousness without some objective reason to combine the teachings of the references. Ex parte Levengood, 28 USPQ2d 1300 (Bd.Pat.App.& Inter. 1993)."

Here, there is set forth no objective basis for combining the teachings of the references in the manner used by this rejection, and selecting the helpful portions from each reference while ignoring the unhelpful portions. An objective basis is one set forth in the art or which can be established by a declaration, not one that can be developed in light of the present disclosure. If the rejection is maintained, Applicant asks that the Examiner set forth the objective basis found in the references themselves for combining only the favorable teachings of the references, while ignoring the unfavorable teachings.

Applicant asks that the Examiner reconsider and withdraw this ground of rejection.

Claims 9, 18, and 20 are rejected under 35 USC 103 over Salatino '343, Chiu '132, and Sato '064, and further in view of McArdle '172 or Insaka '667. Applicant traverses this ground of rejection.

The combination of Salatino, Chiu, and Sato does not teach the limitations of claims 1 and 11, whose limitations are incorporated into claims 9 and 18, or claim 20, for the reasons stated above. McArdle and/or Insaka do not add anything in this regard. Accordingly, this combination of 4 or 5 references does not teach the limitations of the rejected claims.

Applicant asks that the Examiner reconsider and withdraw this ground of rejection.

Applicant submits that the application is in condition for allowance, and requests such allowance.

This paper is filed by the undersigned, who is not presently an attorney of record, pursuant to 37 CFR 1.34(a), MPEP 405, at the instruction of the attorney of record.

I hereby certify that this paper (10 pages of text of the Amendment and 2 pages of attachment, for a total of 12 pages) is being facsimile transmitted to the Patent and Trademark Office at fax 703-872-9310 on May 27, 2003.

Respectfully submitted,

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

underlined material is to be inserted, [bracketed] material is to be deleted, and --material set off by dashes-- is to be added.

Claims:

6. (Amended) The method of claim 1, wherein the step of providing a first component and a second component includes the steps of

providing a sensor chip assembly as the first component.

7. (Amended) The method of claim 1, wherein the step of providing a first component and a second component includes the steps of

providing a sensor chip assembly as the first component, and

providing a mounting platform as the second component.

15. (Amended) The method of claim 11, wherein the step of providing a first component and a second component includes the steps of

providing a sensor chip assembly as the first component.

16. (Amended) The method of claim 11, wherein the step of providing a first component and a second component includes the steps of

providing a sensor chip assembly as the first component, and

providing a mounting platform as the second component.

The CASSELL DICTIONARY of CHEMISTRY

PERCY HARRISON
and
GILLIAN WAITES

CASSELL

thermal analysis A technique of QUALITATIVE ANALYSIS based on the detection of gases given off, or changes in mass of a solid sample, as it is slowly heated.

Thermit process A reaction used to extract magnesium and chromium from their ores and sometimes also used to produce high temperatures for welding. The oxide of the metal concerned is mixed with finely powdered aluminium and the mixture ignited by setting fire to a strip of magnesium. The aluminium is oxidized and reduces the less reactive metal, for example:

$$Cr_2O_3 + 2Al \rightarrow 2Cr + Al_2O_3$$

thermochemistry The branch of physical chemistry that concerns itself with energy changes in chemical reactions, such as the calculation of HEATS OF FORMATION.

thermodynamic equilibrium The state in KINETIC THEORY where individual molecules are exchanging quantities such as energy and momentum, or reacting chemically, but the total amount of any chemical present, or the total energy, is unchanging. Thus the system can be meaningfully described by quantities such as temperature or the chemical concentration of its constituents.

thermodynamics The study of thermal ENERGY changes and ENTROPY.

Thermodynamics is based on four laws. The ZEROTH LAW defines the concept of temperature, by stating that two objects are at the same temperature if there is no net heat flow between them when they are in thermal contact. The FIRST LAW encapsulates the LAW OF CONSERVATION OF ENERGY including INTERNAL ENERGY and the recognition that heat is a form of energy. The SECOND LAW defines the concept of entropy, a measure of the degree of disorder in a system, and states that the entropy of a closed system can never decrease. The consequence of the third law, the NERNST HEAT THEOREM, is that it is impossible to reach ABSOLUTE ZERO in a finite number of steps.

See also CARNOT ENGINE.

thermometer Any device for measuring TEMPERATURE.

thermoplastic, *thermosoftening plastic* Any PLASTIC that can be repeatedly softened on heating and hardened on cooling. In contrast to THERMOSETTING PLASTIC, these thermoplastics do not undergo cross-linking on heating and can therefore be resoftened. Examples include POLY(ETHENE), POLYSTYRENE, POLYVINYL CHLORIDE (PVC).

thermoset *See* THERMOSETTING PLASTIC.

thermosetting plastic, *thermoset* Any PLASTIC that can be moulded to shape during manufacture but which sets permanently rigid on further heating. This is due to extensive cross-linking that occurs on heating and cannot be reversed by reheating. Examples include PHENOL-FORMALDEHYDE RESINS, EPOXY RESINS, BAKELITE, POLYESTERS, POLYURETHANE and SILICONES.

thermosoftening plastic *See* THERMOPLASTIC.

thiamine, *vitamin B_1* A VITAMIN of the VITAMIN B COMPLEX that is a precursor of a coenzyme involved in carbohydrate metabolism. Thiamine is found in seeds, grain, yeast and eggs. Deficiency causes beri-beri, a disease causing inflammation of nerve endings resulting particularly in difficulty in walking.

thin-layer chromatography (TLC) A CHROMATOGRAPHY technique widely used for analysing the components in liquid mixtures. The stationary phase is a thin layer of an absorbent solid, such as aluminium oxide, supported on a vertical glass plate.

thioalcohol *See* THIOL.

thiocyanate Any salt of THIOCYANIC ACID, containing the ion SCN^-, or an organic compound containing –SCN as a FUNCTIONAL GROUP. The salts can be formed by the direct reaction of CYANIDES with sulphur, for example

$$KCN + S \rightarrow KSCN$$

thiocyanic acid (HSCN) An unstable gas that POLYMERIZES on heating. Thiocyanic acid can be formed by the reaction of potassium hydrogensulphate on potassium thiocynate,

$$KHSO_4 + KSCN \rightarrow K_2SO_4 + HSCN$$

thiol, *mercaptan, thioalcohol* Any one of a group of organic compounds containing the thiol group –SH (also called the mercapto group or sulphydryl group). Thiols have strong, unpleasant odours. They are sulphur analogues of ALCOHOLS in which the oxygen atom has been replaced by a sulphur atom. An example of a thiol is ethane thiol, C_2H_5SH. Thiols are easily oxidized to disulphides.

thiophene (CH_4N_2S) A colourless liquid with a odour similar to that of benzene; melting point –38°C; boiling point 84°C. It occurs in